Art. XV.—*Further Notes on the Horowhenua Coastal Plain and the Associated Physiographic Features.*

By G. Leslie Adkin.

[*Read before the Wellington Philosophical Society, 18th September, 1918; received by Editor, 18th September, 1918; issued separately, 26th May, 1919.*]

In this paper I present further data bearing on the history of the Horowhenua coastal plain and the associated Quaternary deposits, and also discuss some of the main points raised by the dissension of opinion between Dr. Cotton* and myself.†

Dimensions and Eastern Limits of the Horowhenua Coastal Plain.

As shown by the following table, the Horowhenua coastal plain attained its maximum breadth of twenty-six miles in the vicinity of Palmerston North,‡ and gradually narrowed in a south-westerly direction.

Localities.	Two Miles South of Paekakariki	Te Horo.	Otaki	Muhunoa.	Levin.	Buckley Road, Shannon	On Palmerston–Pahiatua Road.
Width in miles ..	0	3½	4	8	8½	12	26
Altitudes above sea-level, in feet§	..	320	330	360	530	540	770
Distances between, in miles	17	4½	9	4	4½	26	

The thickness of the coastal-plain formation‖ depends upon the relief of the early Pleistocene land-surface upon which it lies, attaining its maxima and minima along the margin of the old land according to its remoteness from or proximity to the apexes of the Ohau, Otaki, and other fans. Two miles south of Shannon the formation lies on the lower part of the northern slope of the Ohau fan, and there its original thickness was about 500 ft. On the lower edge of the southern slope of the fan of the Manawatu River, near the margin of the old land due east of where Linton now stands, its former thickness probably exceeded 600 ft. These figures are only approximate, and require to be verified or corrected by calculations based on careful surveys.

* C. A. Cotton, The Geomorphology of the Coastal District of South-western Wellington, *Trans. N.Z. Inst.*, vol. 50, pp. 212–22, 1918.

† G. L. Adkin, The Post-Tertiary Geological History of the Ohau River and of the Adjacent Coastal Plain, Horowhenua County, North Island, *Trans. N.Z. Inst.*, vol. 43, pp. 496–520, 1911.

‡ The writer has at present no data as to the extent of the Horowhenua coastal plain north of this point, beyond which, however, it is known to extend.

§ These are the altitudes of the highest traceable sandstone in the localities specified.

‖ The term "raised-beach formation" has been abandoned as being misleading, substituting "coastal-plain formation," "coastal-plain sandstone," or, more briefly, "sandstone formation."

South of the Manawatu Gorge the former shore-line (*i.e.*, the eastern or inner margin of the coastal plain) lay along the western border of the old land, and was very irregular and indented, the sea winding in and out round the projecting spurs. Sea-cliffs were cut along the old-land margin, and these in places are in a good state of preservation, notably near Paekakariki, Otaki, and Ohau, and between Shannon and Tokomaru.

As shown by the altitude of the upper edge of the coastal plain on the Palmerston–Pahiatua Road (see above table), it is evident that prior to its initial emergence an arm of the sea ran through the Manawatu Gorge and spread out in the Woodville–Pahiatua–Dannevirke district to form a shallow harbour or estuary, into which the Manawatu River flowed. "Lacustrine deposits" are reported to exist in the district defined, the supposed former lake being due to the ponding of the Manawatu River by an unusually rapid uplift of the mountain axis.* This theory is now shown to be erroneous; the supposed lake was in reality an estuary, and the so-called "lacustrine deposits" are doubtless estuarine deposits.

DISSECTION AND TOPOGRAPHIC DEVELOPMENT OF THE HOROWHENUA COASTAL PLAIN.

Since its uplift above sea-level the coastal plain has been very thoroughly dissected by the rivers and streams that extended their courses across it, assisted by others that take their rise within its borders. Extensive stretches of plain unbroken by the marks of stream erosion, which at first must have been the predominant feature, no longer exist. Instead, irregular strips and areas of flat open plain are intersected by a network of water-courses. These flat areas, however, are not the original surface of the coastal plain, but denuded surfaces corresponding to the original one. The erosion by rain, for instance, uniformly lowered the surface of large areas, the resultant silt being washed into the channels of the then less-developed stream-systems.

The rivers, the larger of the minor streams, and the lesser ones have all left their distinctive marks upon the plain, producing a diversity of surface forms. The present topography therefore varies from youthful to mature.

The rivers, the former fan-builders, in their passage from the hills to the sea rapidly cut into the soft marine beds (or sandstone, as they may briefly be designated), and swept them clear away, exposing their fans, without exception, to a greater or less extent.

The usual work of the larger of the minor streams was to carve wide shallow channels in the sandstone, and later to aggrade their bottoms with fine alluvium, forming flood-plains often of considerable fertility. Bordering the courses of these streams the topography of the sandstone has often reached a mature stage — of low relief and smooth curved contours.

The lesser minor streams are for the most part tributaries of the larger ones. Many take their rise in the plain, and occupy narrow youthful channels divided by broad flat-topped sandstone ridges. Others of brisker flow, with their sources in the hills, have cut in the sandstone formation a descending succession of wide-flaring, flat floors, usually free from even a veneer of alluvium, and opening out at different levels into the valley

* D. PETRIE, Account of a Visit to Mount Hector, &c., *Trans. N.Z. Inst.*, vol. 40, p. 290, 1907.

of the trunk stream. These correspond to successive levels in the valley of the trunk stream—namely, benches cut in the sandstone side of the valley as it was deepened; the surface of the built flood-plain; and subsequent levels cut in the flood-plain alluvium. Along the margin of the ranges the lesser streams have deposited cones and steep slopes of alluvium; these attain their maximum development between Waikanae and Te Horo, and north of Tokomaru.

Sufficient has been said to show that the topography of much of the coastal plain is quite youthful, and that only small tracts here and there have reached a mature or submature stage. On the other hand, two portions exist in which, by reason of their position and the vagaries of the drainage-lines, modification by stream erosion has been even less pronounced than elsewhere, and their topography is strikingly youthful. These portions, both situated at the foot of the ranges—one at Palmerston North, the other near Shannon — have been somewhat isolated by the larger adjacent streams, and, as their present surface has been but slightly lowered from the original level, they stand out plateau-like above the surrounding country. The comparatively few gullies intersecting them are as a rule deep, steep-sided, and narrow, the wide flat-topped divides terminating abruptly at the top of the gully-walls. A peculiar feature is that the streams draining these gullies seem to have reached a more mature stage than the topography. The topography is undoubtedly youthful, as shown by the wide, flat-topped uplands, but the streams themselves are sluggish, and often meander on flat, graded bottoms, frequently swampy The explanation is probably the porous character of the formation, which retards the development of the gullies and consequently of the topography, while the streams have meanwhile attained a temporary base-level.

The Deformation of the Southern End of the Horowhenua Coastal Plain.

Until recently the writer entertained the belief that the Horowhenua coastal plain terminated, and that its inner margin descended to sea-level, in a south-westerly direction, coincidently with the present complex lowland, at a point about two miles south of Paekakariki. Doubt was cast on this supposition by the compilation of the above table, which shows, *inter alia*, the altitudes of the inner margin of the coastal plain southwards from the vicinity of the Manawatu Gorge. As tabulated, these altitudes form a descending series (marked by a certain step-like irregularity), proving the differential character of the uplift that raised the coastal plain. The method adopted to determine the height of the inner margin of the coastal plain was to select suitable localities along its length and ascertain the altitude of the highest traceable beds in those localities. The irregularity of the altitudes obtained is explained by the denudation of the beds even in the selected localities

On the Palmerston–Pahiatua Road, eight miles south of the Manawatu Gorge, the coastal plain appears to have attained its maximum uplift, and here the beds of its inner margin are found 770 ft. above the present sea-level. Proceeding southwards, the beds on the inner margin are found at decreasing altitudes until Te Horo is reached, near which place the sandstone beds are found at a height of 320 ft. If, as previously supposed, the inner margin of the coastal plain descended to sea-level at Paekakariki, the average slope of that margin would have been about 13 ft. per mile, and the greatest altitude it attained at Te Horo would have been 200 ft. At

Te Horo the sandstone beds are, however, traceable at the foot of the hills up to a height of 320 ft., leaving a discrepancy of 120 ft.

Plotted diagrammatically to scale (fig. 1), the available data show that the inner margin of the coastal plain had a southward slope of only 10 ft. per mile, so that the southern end of the plain originally extended beyond Paekakariki some miles south of the present entrance of Porirua Harbour. This being so, it is evident that some great change has taken place, a change involving the destruction, or at any rate the disappearance, of the former southern portion of the coastal plain, since south of Paekakariki a bold steep coast, and not a lowland fringe, borders the sea. I shall now endeavour to demonstrate the cause and features of this change, and shall also present certain corroborative phenomena.

The south-western portion of the Wellington Province may be regarded as consisting of a series of earth-blocks, both large and small. The largest block, comprising the Tararua and Rimutaka Ranges, is bounded on the east by the Wairarapa fault, and is rising, as evidenced by its relation to the Wairarapa depression, situated at the base of its steep eastward-facing scarp, and by the emergence of the Horowhenua coastal plain, which lies

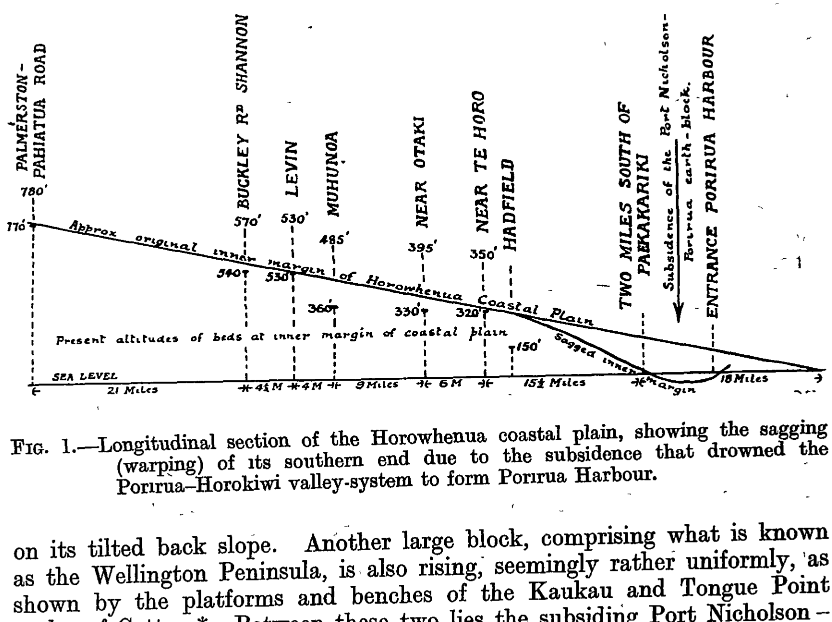

FIG. 1.—Longitudinal section of the Horowhenua coastal plain, showing the sagging (warping) of its southern end due to the subsidence that drowned the Porirua–Horokiwi valley-system to form Porirua Harbour.

on its tilted back slope. Another large block, comprising what is known as the Wellington Peninsula, is also rising, seemingly rather uniformly, as shown by the platforms and benches of the Kaukau and Tongue Point cycles of Cotton.* Between these two lies the subsiding Port Nicholson – Porirua Harbour block, now cut in two by the Wellington fault. On the south-east, or downthrow, side of the fault the subsiding tendency became a pronounced fact, and this part of the block has been depressed below the present sea-level to form the harbour of Wellington; on the other hand, the portion north-west of the fault was differentially tilted northward, drowning the stream-valleys incised upon its seaward border to form the branching Porirua Harbour.

* C. A. COTTON, Notes on Wellington Physiography, *Trans. N.Z. Inst.*, vol. 44, pp. 246–65 (ref. to pp. 248–51), 1912.

The subsidence or downward tilting of the northern part of the Port Nicholson - Porirua block involved the southern end of the Horowhenua coastal plain, which lay athwart its axis, gradually bending and depressing it below sea-level somewhat in the fashion depicted in fig. 1.* North-westward of the main axis of subsidence the surface of the subsiding portion of the coastal plain sloped up to the normal slowly rising surface of that part lying beyond the influence of the Port Nicholson - Porirua block.†

It is a well-established physiographic principle that sea erosion is seldom, if ever, extensively developed on a rising coast, but that subsidence not only causes sea-advance but also facilitates sea erosion. On the rising and emerging major portion of the Horowhenua coastal plain there is no evidence of its seaward edge having been cut back by the action of the sea; on the other hand, the down-warping of the narrow southern end of the coastal plain permitted not only a local inroad of the sea, but also simultaneous marine erosion. This erosion advanced, in the immediate vicinity of the intersecting axis of subsidence, to the cliffed margin of the old land: this took place a couple of miles north-east of Paekakariki, as pointed out by Cotton.‡ Farther away, as at Hadfield,§ the newer line of cliffs lies half a mile to seaward of the old-land cliffs, and more remote still they die out and do not reappear.

The Significance of the River-cut Rock Floors in the Ohau Valley.

The evidence I wish to bring forward in support of my contention|| that the Horowhenua piedmont alluvial plain, formed by the lateral coalition of the larger river-fans, was built up on a stationary surface at the foot of an inland mountain range, and not, like the Canterbury Plain, as conclusively demonstrated by Speight,¶ laid down on a subsiding maritime area, is furnished by the old river-cut rock floors in the intermont portion of the Ohau valley. Unlike the Canterbury rivers, those of Horowhenua—*e.g.*, the Ohau—as the result of a fixed base-level, reached a state of perfect adjustment of load to volume and grade. If the Ohau fan and valley-plain had not reached completion, and if the deposition of detritus by the river had not ceased, the rock floors, by which the area of the valley-plain was considerably extended, could not have been formed. The capping of the shingle beds of the valley-plain with a thick layer of clay alluvium was in itself evidence of the termination of the task of fan-building; and the cutting of the rock floors by the powerful lateral corrasion which immediately followed conclusively proves the fact.

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* This assumes the very recent advent of the Wellington fault. (See also Cotton *loc. cit.*, p. 258.)

† The southern end of the Horowhenua coastal plain was intersected *obliquely* by the axial line of the Port Nicholson - Porirua block, the northern extension of which is regarded as running through the gap at Pukerua railway-station, and thence, inside the island of Kapiti, seawards, its general trend being slightly east of north. The entrance to Porirua Harbour seems to be a submerged water-gap.

‡ *Loc. cit.* (1918), p. 218.

§ The coastal-plain formation has been truncated for a distance of a mile and a half along the line of railway northward from the Hadfield flag station, and cliffs from 60 ft. to 90 ft. high have been developed.

|| G. L. Adkin, *loc. cit.*, p. 504.

¶ R. Speight, A Preliminary Account of the Geological Features of the Christchurch Artesian Area, *Trans. N.Z. Inst.*, vol. 43, pp. 421–24, 1911.

Lateral corrasion was a negligible factor during the building of the fan and valley-plain; but with the cessation of deposition it became predominant, and the hill-spurs and ridges bounding the built part of the valley-plain were cut back on a level with its surface. The large amount of material derived from this lateral corrasion was transported across and deposited beyond, and not upon, the surface of the fan, the spoil being delivered to the trunk Cook Strait River, of which at that time the Ohau was but a branch.

In several places the old rock floors still exist up to their original level, and form small flat-topped rocky hills. Elsewhere they have been incised by the Ohau and its tributaries rejuvenated in the present cycle of erosion, and their former extent is marked by rock terraces capped by gravel veneers of varying thicknesses. Little, if any, gravel or shingle was deposited on the *original* surface of the rock floors, showing how complete was the transportation of coarse detritus by the river during the time of lateral corrasion. Similar rock floors will doubtless be found in the intermont portions of the valleys of the other Horowhenua rivers.

DR. COTTON'S INTERPRETATION OF THE PHYSIOGRAPHY OF THE COASTAL LOWLAND.*

Cotton's views regarding the history and sequence of deposits of the coastal lowland which extends from Paekakariki to Palmerston North and beyond appear to be the result of a misconception arising from observations based for the most part on the extreme southern part of the coastal belt. As shown above, that part of the coastal belt is not typical of the whole, the important incidents of deformation and sea erosion being peculiar to that locality. I hasten to say that Cotton's observations on the area a few miles north-east of Paekakariki† are undoubtedly substantially correct: it is the application of inferences drawn from that locality to the coastal lowland in general to which exception must be taken.

The Sequence of the River-fans and the Sandstone Formation.

In the paper referred to, Cotton dissents from my view that the coalescing fans of the rivers along this coast form the basal member of the Quaternary formations, and that it (the basal member) is directly overlain by the sandstone formation (my Horowhenua coastal plain). Cotton puts the sandstone formation at the base of the series, and regards the river-fans, with which he classes all the gravel deposits of the lowland, as being "among the youngest elements of the lowland physiography."

One of the chief causes of Cotton's divergent opinion as to the sequence of these formations would seem to be the greater complexity of the lowland than he at present recognizes. In addition to the coalescing fans (piedmont alluvial plain) of the larger rivers, and the sandstone formation (Horowhenua coastal plain), the deposits and activities of the minor streams, large and small, have been the cause of innumerable complications. As these minor streams drain the same terrains as the rivers, the gravels and other deposits of both are in many respects similar, and frequently indistinguishable; hence great confusion and false deductions may result from any but the most careful study. The classing-together of the great river-fans and

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* *Loc. cit.* (1918.). † *Ibid.*, p. 218.

the small fans, alluvial slopes, and flood-plains of the minor streams seems inadvisable, since, according to the present writer's interpretation of the physiographic history, a great space of time and two diastrophic movements separated the building of the two groups of deposits. The superposition of the coastal plain on the river-fans is, however, a conclusion founded on facts, which are as follows :—

The exposed surface of the upper part of the Ohau fan surmounts the right bank of the trench in which the river now flows, and extends to the line of Queen Street, which runs east from the town of Levin. Northward of this line a continuous sandstone landscape stretches away in the direction of Shannon, and is traversed by the flood-plain of the Koputaroa Stream, a tributary of the Manawatu River. Two miles and three-quarters north-west of Queen Street an artesian well was sunk in the Koputaroa flood-plain to a depth of 90 ft., and the beds pierced were approximately as follows :—

Yellow clay	9 ft.	Alluvium of Koputaroa Stream (flood-plain).
Gravel	10 ft.	
Blue clay	3 ft.	
Sand	56 ft.	Sandstone formation.
Blue swamp-clay with wood ..	4 ft.	Ohau fan.
Shingle with seam of clay ..	8 ft.	

As the site of this well is 58 ft. above sea-level, the surface of the Ohau fan at this point is 24 ft. below sea-level, a level which corresponds very exactly with the produced slope of the exposed surface of the fan between the line of Queen Street and the fan-apex. The interfingering of fan gravels and sandstone formation over a zone nearly three miles in width is in the highest degree improbable, so the superposition of the sandstone on the fan, and not the reverse, is thus established.

Similar relationships are revealed in the present valley of the Ohau River at a point two miles and a half up-stream from the Wellington–Manawatu Railway bridge. A river-cliff section shows the surface of the Ohau fan surmounted by a thick undisturbed layer of sandstone, which has been preserved in this site by overlying gravels derived from the initial incision of the Ohau valley-plain when the cutting of the present trench-like Ohau Valley commenced. This interesting stratigraphic occurrence is shown and explained in the diagrams (fig. 2), and no further comment is necessary here other than to emphasize its bearing on the question raised.

The Origin and Nature of the Sandstone Formation.

The evidence outlined above, by proving that the sandstone formation lies upon the river-fans, and not *vice versa*, places serious difficulties in the way of an acceptance of Cotton's theories of a prograded strand-plain composed of gravel fans and peneplaned sand-dunes. The theory is forced to demand a gradual secular subsidence of the area of deposition in order to account for old land-surfaces contained within the gravel fans and now depressed, in some cases hundreds of feet, below the present sea-level; it relies on the supply of an immense amount of waste with which to maintain its *existence* in the face of prolonged subsidence; and it postulates occasional small movements in a reverse direction to enable retrogradations of the coast-line under wave-attack to advance not more than about half its former prograded width. The last precludes all possibility of a movement of uplift on a fairly large scale, certainly not more than 100 ft.

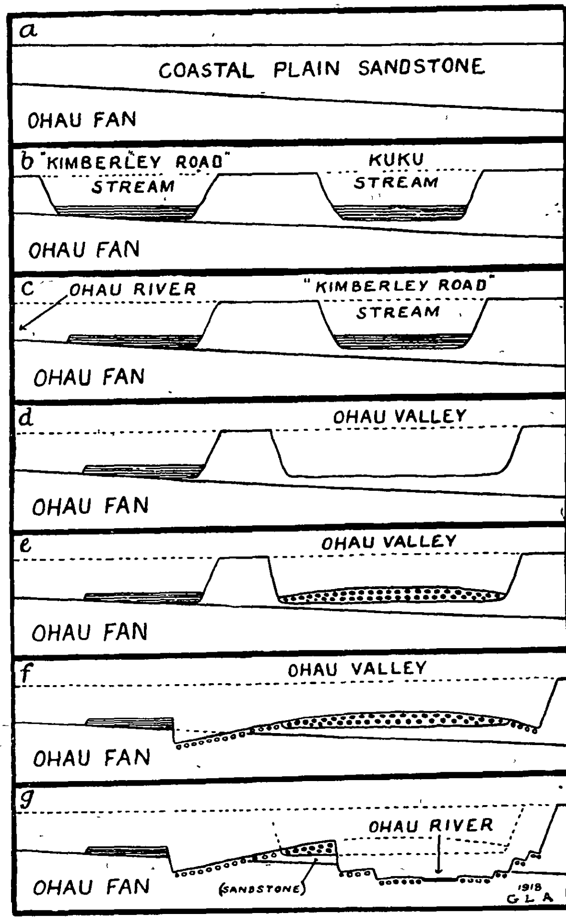

FIG. 2.—Diagrammatic sections showing the evolution of the Ohau Valley in its fan about a mile below the fan's apex.

a. Coastal-plain sandstone resting on the south-west slope of the Ohau fan.
b. The cutting of the shallow valleys of the "Kimberley Road" Stream and the former Kuku Stream; and the building of flood-plains (horizontal shading).
c. The invasion of the Kuku Valley by the "Kimberley Road" Stream, and the removal of the right bank of the latter's former valley by the Ohau River flowing in its "north-west" course.
d. Diversion of the Ohau River (at a point up-stream) into the original Kuku Valley, and its enlargement by the river.
e. The alluviation (black dots) of the valley of the Ohau (at this point) by gravels, &c., derived from the incision of the "valley plain."
f. The effect of lateral corrasion by the Ohau River after the alluviation. (Terrace or flood-plain gravels shown as open dots.)
g. Final deepening and terracing of Ohau Valley, resulting in its present form. In the high terrace-face on the left a layer of sandstone lies between the upper gravels (black dots) and the surface of the Ohau fan.

How, then, can Cotton's alternative explanation of a coastal plain followed by "the remaining events . . . . the same as those outlined in the previous explanation" be possible? Obviously it could not. The secular subsidence would carry the "coastal plain of subaqueous sands," along with the old land-surfaces mentioned above, far below the present surface, and it would be hidden either by continuous river-gravels or by blown sand, and the lowland would approximate to that suggested by Cotton in his first explanation. This, I think, disposes of the alternative explanation.

Since the gravel fans of the larger rivers are below and not upon the sandstone formation, the prograding of Cotton's strand-plain had to rely, in face of subsidence, on the supply of sand and the detritus of minor streams. But proof has been given above that the river-fans were built not on a subsiding maritime area, but on a stationary inland surface. Cotton's principal explanation is thus as untenable as the alternative one. If, however, these difficulties can be explained away, further evidence is furnished by the texture and structure of the sandstone formation.

The variation in the composition of the sandstone formation in a north-east and south-west direction—viz., from friable pumiceous sand north of Tokomaru to relatively compact greywacke-derived quartzose sand south of that locality—cannot be explained by the aeolian hypothesis; but if the variable material is regarded as shallow-water deposits laid down along a shelving coast to form a potential coastal plain no difficulty presents itself. Similarly, by the aeolian theory, the sand carried farthest inland would be the finest, or at least as fine as that at the source of supply—*i.e.*, along the prograding shore-line. But this is an inversion of the actual facts. All along the coastal lowland, and in the quartzose areas more especially, the sandstone is coarsest along the inner margin, grading to a finer texture towards the present coast-line—facts strongly supporting the marine-deposition theory and quite adverse to the aeolian.

Perhaps the most striking features of the sandstone formation are the cross-bedding and delicate lamination. The dunes of blown sand that lie nearer the present coast-line do not exhibit a similar structure, and it is in this respect that the two formations are in such strong contrast, though the compact texture of the one and the looseness of the other is equally striking. This diversity of structure under similar, if not identical, climatic and geographical conditions points to dissimilar origins for the sandstone and the blown sand: the former must thus be a subaqueous deposit.

I agree with Cotton that pseudo-stratification is sometimes present in the sandstone; but there is also quite frequently a well-defined true stratification. Alternations of thin beds of loam or clay interstratified with thicker ones of sandstone are qute common. Occasionally a sandstone stratum is intersected by two sets of joints, and breaks up into cubical blocks while *in situ*, while the layers above and below are compact. In these and other ways the presence of true stratification is revealed, and I contend that the structure of the sandstone formation adds to the weight of evidence of its having originated as a marginal marine deposit uplifted to form a young coastal plain.

I have but little hesitation in affirming that the peneplanation of dunes of blown sand* is a physical impossibility; such, in any case, is the verdict

* C. A. Cotton, *loc. cit.* (1918), p. 216.

in this district. Bordering the present Horowhenua coast-line, a belt of dunes, the aeolian origin of which has never been questioned, covers a strip of country from three to six miles in width. The dunes along the inner margin of the belt are the oldest, and these have reached a state of very considerable stability. These old dunes are generally covered with a thick layer of humus derived from the growth and decay of manuka and other vegetation, and are also fixed by a turf of natives grasses. In spite of these characteristics no trace of a drainage-system is being or has been incised upon them. Rain descending upon the dunes sinks immediately into their substance, to the complete exclusion of any run-off whatever. The great difference between the dunes and the sandstone is that in the one a cementing medium is entirely lacking—hence their great porosity and immunity from dissection by surface waters; whereas in the other the hydration of certain ferrous constituents, together with the presence of colloidal matter,* has cemented the sand-grains into a fairly compact and somewhat impervious mass—sufficient, indeed, to permit of dissection by stream-action.

The River-terraces.

In support of his theory of occasional phases of retrogradation of the shore-line of a strand-plain, Cotton claims that, in addition to the line of cliffs cut by the sea in the toe of the plain, terraces or valley-in-valley forms resulted, and furnish evidence of the retrogradation. The only true terraces

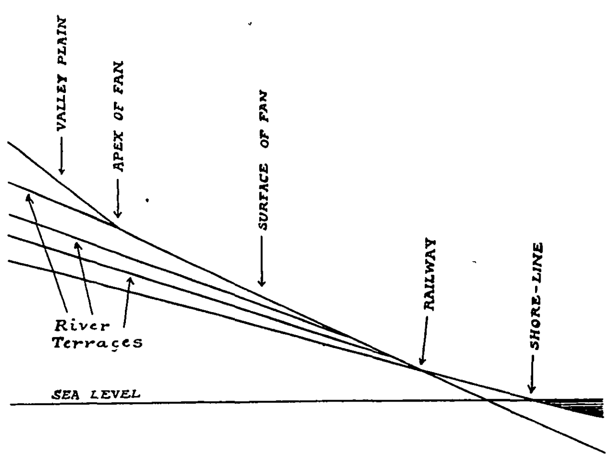

FIG. 3.—Generalized diagrammatic section of the Ohau fan, showing actual form of terraces.

of the Horowhenua lowland are those that fringe the sides of the trench-like valleys cut in the large gravel fans. It can be shown by two lines of evidence that the existing terraces do not furnish evidence of coastal retrogradation: (1.) If, as Cotton himself points out, the rivers rebuilt their fans during a second (or some later) period of progradation, they must have filled and obliterated the terraces of the trenches incised during the preceding

* E. C. BARTON, The Work of Colloids in Sandbank and Delta Formation, *Geog. Journ.*, vol. 51, pp. 100–15, 1918.

period of retrogradation. Thus the present terraced trenches of the fan-building rivers cannot be relics of the retrogradational phase, and must therefore be due to some other cause and of a later date. (2.) The profile of the existing terraces is not such as would have resulted from shore-recession.

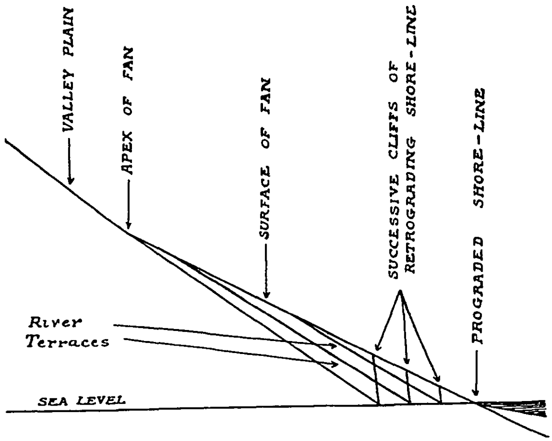

FIG. 4.—Diagrammatic section of a river-fan, showing form of terraces developed during a period of retrogradation following the normal progradation of the shore-line by a copious supply of waste.

This is clearly shown by a comparison of fig. 3 and fig. 4; the former shows the form and arrangement of the terraces of the Ohau Valley, and the latter, terraces developed in a fan truncated and trenched as a result of retrogradation of the shore-line by sea erosion.

ART. XVI.—Ceina, *an Aberrant Genus of the Amphipodan Family Talitridae.*

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THE genus *Ceina* was established in 1893 by Della Valle for the single species *C. egregia* (Chilton), which had been described in 1883 under the genus *Nicea* Nicolet, a genus now considered to be identical with *Hyale* H. Rathke. The species was placed under *Nicea* because it appeared in many respects to come near to *Nicea rubra* G. M. Thomson, *N. fimbriata* G. M. Thomson, and other species then referred to *Nicea;* but it was pointed out at the time that it differed in several important characters, and some points in the original description were left more or less doubtful. Stebbing in 1888 (p. 1712) mentioned the species, stating that its generic position was not quite free from doubt. In establishing the new